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FAO Plant Protection Bulletin

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World Reporting Service on Plant Diseases and Pests

The Present Status of Economic Entomology in Indonesia

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Agricultural production in Indonesia is divided into two major categories: estate and smallholder production. The estates deal almost exclusively with the export crops: rubber, tea, coffee, sugar, tobacco, pepper, cacao, oil palm and quinine. Most smallholders, on the other hand, produce only locally consumed food crops, including rice, coconut, maize, cassava, vegetables and fruits; however, they now produce up to 50 percent of certain export crops, of which rubber is particularly important.

Insect Control on Estates

The estates, owned primarily by foreigners, are survivals from the prewar colonial days. Since the war a few of the smaller estates have passed into the hands of locally resident Chinese; very few are owned by Indonesians. During prewar days the following three research institutions, specializing in export crops and supported by the estates, were set up. These are still functioning but at present there is no entomologist with a university degree on the staffs;

Centrale Proefstations Vereniging (Central Association of Experiment Stations). Researches on rubber, tea, coffee, cacao and tobacco for Java and southwest Sumatra. Staff nearly prewar size.

Algemene Vereniging van Rubberplanters ter Oostkust van Sumatra (*AVROS*). Researches on rubber, oil palm and tea for east Sumatra. Staff now greatly reduced.

Sugar Research Station. Researches on sugar cane for east and central Java. Staff now greatly reduced.

Adequate methods of control of all insects seriously affecting estate production were worked out before the war but many of the recommended control methods have been abandoned, either because labor costs have increased many times or through the introduction of synthetic organic insecticides. A few new problems have arisen such as the appearance of blister blight on tea in 1951. This very serious disease is now considered to be under control through the use of copper oxychloride.

The major pests affecting estate crops and the recommended control treatments are listed in Table 1. Cultural control recommendations which often require very considerable labor are not always followed.

Insect Control on Smallholdings

Because of lack of capital to purchase chemicals and application equipment and probably because of their lack of appreciation of the importance of insect control, the smallholders who are growing export crops do not as a rule follow the recommendations of the estate crop research institutes. Possibly because of this, their production is usually of lower quality and quantity than on estates.

A few relatively minor crops, e.g. potatoes, cabbage and soybeans, which are in part exported, are grown exclusively by smallholders. For these three crops the smallholders do undertake chemical treatments which are usually required for controlling

TABLE 1. – *Major pests of estate crops in Indonesia and control measures recommended* [a]

Crop	Pest	Type of damage	Pre–war control	Present treatment
Tea	*Helopeltis* sp.	Damage to young leaves; dieback of young twigs	Cultural; derris	DDT, BHC, dieldrin
	Tenuipalpus sp.	Leaf fall; dieback of the bush	—	Sulphur dusting; experiments with new acaracides
	Nematodes	Dieback of nursery plants	—	Cultural
Cacao	*Acrocercops cramella*	Destruction of pods	Cultural	Cultural; successful experiments with endrin
	Rats and *Calliosciurus* sp.	Damage to fruit	Occasional baiting	Occasional baiting
Rubber	Carabao and goats	Scraping of bark; eating young plants	—	—
Coffee	*Stephanoderes hampei*	Damage to berries	Cultural	Cultural
	Pseudococcus citri	Damage to berries, young shoots	Cultural	Cultural; experiments with systemics
	Ferrisia virgata	Damage to young shoots	Cultural	Cultural; experiments with systemics
	Ragiolepes longipes	Spreading coccids; attacking laborers	Cultural	Cultural
	Anguillulina sp.	Injury to nursery plants	Cultural	Cultural
Pepper	*Dasynus piperis*	Damage to berries	Nicotine spray	Nicotine spray
	Nematode	Death of plants	None	None
Sugar cane	*Scirpophaga nivella*	Boring top stem	Cultural	Cultural
	Diatraea venosata	Boring lower stem	Cultural	Cultural

[a] Prepared by Ir. W.P. Van der Knapp, Botanical Research Section, Central Association of Experiment Stations.

major insect pests and diseases, such as late blight (*Phytophthora infestans*) and *Epilachna* sp. on potatoes, diamond-back moth (*Plutella maculipennis* Curt.) on cabbages, and *Phaedonia* (*Plagiodera*) *inclusa* Stal. on soybeans.

Potatoes are routinely treated for *Phytophthora* with copper sulphate; since its introduction for the control of blister blight of tea, copper oxychloride is used also. Preventive *Epilachna* treatments are given routinely together with the *Phytophthora* spray, using 50 percent wettable DDT at the rate of 1 kg. in 200 liters water. Without preventive treatment, outbreaks occur about once every two or three crops. A single DDT spray is usually considered adequate to control an outbreak.

Plutella maculipennis is a most serious pest of cabbage. Since the first use of DDT on cabbage in 1948 resistance of the insect has increased considerably. An increase in the dosage and frequency of application follows each increase in resistance. This is in spite of local residue regulations which are comparable to those in the United States. One extreme example was the application

of a 50 percent DDT dust at 10 kg. per hectare, every five days from planting until harvest. Vos, Entomologist at the General Research Institute, Bogor, introduced *Angitia cerophage* Grav. for biological control of *Plutella* (6). In some places, possibly because DDT application was less common, *Angitia* became established and chemical control is no longer considered necessary. However, in some of the more important cabbage areas the establishment of *Angitia* failed, probably as a result of the DDT treatments.

Soybean is the third crop which smallholders generally feel worth the cost and labor of chemical control. *Phaedonia inclusa* feeds on the leaves both as larva and adult. The present recommended control is a low-concentration spray, 0.063 gm. DDT per liter, on the 15th, 30th and 50th day after planting. No resistance has been reported yet.

Coconuts are a major food item for the Indonesian people and in some areas copra is prepared for export. *Artona catoxantha* Hamps., a leaf-feeding caterpillar, occasionally has serious outbreaks. This Zygaenid is found on all the islands of western Indonesia but outbreak areas are limited. The Extension Service maintains a survey and control section to limit damage and prevent spread of the outbreaks only in mid-Java. Derris sprays are applied when parasitism is below a certain level. Van der Vecht (4) has found that one or two instars of the host insect are sometimes completely parasitized by *Apanteles artonae* Rohw. The resultant condition of discontinuous generation leads to a population that is parasite free.

Routine insect control programs are not carried out on other economic crops. On most of them, the farmers do not even bother to practice either mechanical or cultural control. Against a few serious outbreaks of armyworms or cutworms, the Extension Service undertakes control treatments with insecticides which limit their spread.

With the exception of tea, tobacco, pepper, cabbage, potato and soybean planters, the smallholders neither own nor use any insecticides or application equipment. The spray treatments that are used on the above crops are applied with 18-liter knapsack sprayers or with less costly and less efficient equipment. With the best knapsack sprayer one man takes three to five days to cover one hectare. More than half of the cabbage fields are treated with a dusting bag, made with open-mesh cloth about 18 inches square.

Rats are also major pests of crops, causing up to 100 percent losses over large areas. In seriously affected fields the Extension Service occasionally conducts a control program using phosphorous baits for both the rats and wild pigs. Over 500 dead rats per hectare have often been counted; this figure is not considered to be more than half the rat population of the area. The native wild pigs are often numerous and cause considerable damage and, in this Moslem country, they are not usually looked upon as a source of food.

Insect Problems of Specific Crops

The basic crop of the smallholder is rice, which is planted on about 45 percent of their land. The average holding is less than one hectare which is usually broken up into ten or more small, walled-in, flooded plots called "sawahs." Fields which are not flooded but depend on rainfall are called "ladang." Less than 10 percent of the fields of Java and Madura and more than half of Sumatra and Borneo are ladang; Bali is over 80 percent sawah. About 70 percent of all rice in Indonesia is grown on sawahs (3).

The crop planting of most smallholders is limited by the length of the rainy season. Usually the rains begin in November and end in April. A few extra months of rain will permit an extra planting of maize in rain-fed sawah but often there is not enough water to carry the crop to maturity. Irrigated areas usually have enough water for an extra crop before and after rice.

Sawah rice, which yields about 11 quintals milled rice per hectare on average, is subject to attack by many pests. In order of importance they include rice borers, especially *Scirpophaga innotata* Wlk., mentek disease associated with the rice nematode *Radopholus oryzae* Thorne, *Leptocorisa acuta* Thunb., field rats and wild pigs.

The order of importance of pests of ladang rice is different. *Leptocorisa acuta*, white grubs, *Scotinophara* (*Podops*) spp., rats and pigs are all very important and usually more

serious than on sawah. The average crop yield on ladang is less than half that of sawah.

No official estimates of losses due to *Leptocorisa* are available but the ladang farmers consider it their most serious pest and it is also very serious on sawah. In 1951 there were many reports from Java that the yields of sawah areas up to 1,000 hectares, which normally produce above average yields, were reduced 50 to 100 percent by *Leptocorisa*. The writer estimates that over 20 percent of the ladang and 10 percent of the sawah crops are lost to *Leptocorisa*.

There is no recommended control for *Leptocorisa*. Simultaneous planting over a large area would reduce losses but the hand planting methods used preclude such a speedy undertaking. Planting on sawah extends over a two-month period from the beginning of the rainy season. In a few small areas *Leptocorisa* is baited with rotting animal matter.

By counting only dead stalks at maturity, the Extension Service has estimated that about 10 percent of the national rice crop is lost to borers. The writer estimates that 25 percent of the potential sawah rice crop in Indonesia is lost to these insects. No control of rice borers is generally practiced at this time. The Extension Service is now testing insecticides on a few small plots. In a personal communication, H. Townes, United States Point IV Entomologist in the Philippines, reported that on fields of moderate borer infestation endrin increased rice yields 40 percent. Before the war a method of cultural control for *Scirpophaga*, which diapauses from April until the first rains in October-November, was worked out. A rotation system based on planting three weeks after the emergence of moths was recommended, enforced, and proved successful in one area. There is now no enforcement of this program and, perhaps due to ignorance, the farmers are unwilling to practice it.

For other insects on rice no control is practiced. For mentek disease, which is usually worst in areas of irrigated sawah, cultural control is recommended (5).

Rice birds are the pests that receive the most attention from the farmers. They arrive over the fields at ripening time and women stand guard all day with long poles to scare the birds away.

Between harvest and consumption there is an additional large loss of rice due to rats, insects and molds. Most of the rice is stored on the stalk in the open until used.

Maize, the second most important crop of the smallholders, is generally grown in upland areas which are too dry or too high for rice, or during the drier months in rotation with rice. Rice is normally grown from December until April and, if moisture permits, maize will be planted in September and harvested in December or planted in March with hopes of a long rainy season. The average yield is 9 quintals shelled corn per hectare; neither fertilizers nor insecticides are applied. The more important insects on maize are the armyworms and *Heliothis* sp. *Pyrausta nubilalis* Hübn. is considered to be of very minor importance. The control of *P. nubilalis* is reported by Kalshoven (2) to be due to nearly perfect cultural control, achieved by the complete absence of host plants from December until March. In some areas where maize was planted continuously through the wet season, complete loss of crop was reported.

Crotalaria sp. is one of the more important smallholder crops because it is essential to the green manure portion of the rice rotation. The planting of *Crotalaria*, however, is seriously limited because of the shortage of seed. The infestation of *Etiella zinckenella* Treit. severely affects seed production. Two Hypsidae, *Argina cribaria* Cl. and *Hypsa alciphron* Hps., are also important on *Crotalaria*.

Cotton is not now grown commercially in Indonesia because the cost of production is much higher than the purchase price of better quality foreign cotton. The local cotton has a very short staple and is produced without fertilizer, irrigation or insect control. The present yield on Extension Service experimental farms is about 35 kg. per hectare at a cost of about 25 rupiahs[1] per kilogram. The most important cotton insects are: *Platyedra gossypiella* Saund., *Amorphoidea pectoralis* Mshl., *Empoasca* sp. and *Dysdercus cingulatus* F.

On many truck crops damage over 50 percent is normal and philosophically accepted. All of these crops are carried to market by

[1] The official rate of exchange is 11.43 rupiahs to one U.S. dollar.

the farmer, and sold and consumed within walking distance of the point of production. There are virtually no truck crops or fruits preserved either by icing or canning. This lack of transportation and preservation greatly restricts the market for crop surpluses. Only sufficient is planted in each area to compensate for the insect losses and satisfy local demand. Many farmers believe that any increase in production, for instance through insect control, would significantly depress prices and the net result would be more work but no extra income.

The per caput consumption of vegetables in Indonesia is very low compared with the United States. Vegetables are normally used as a garnish to the main dish, rice. Only in the event of a rice shortage is the consumption of vegetables increased. Sweet potatoes and cassava both fall into the category of rice substitutes; maize also becomes accepted in many areas. Since a man spends a full working day carrying to market and selling 10 to 20 kg. of vegetables, the cost is quite high, even in this land of low wages.

In regard to fruits, the situation is similar to that of vegetables. There are seasonal local surpluses, while different type areas not very far away may not have any of that fruit for sale. Homopterous insects, particularly Coccidae and Aleurodidae, are serious pests on many fruits, especially citrus. No insecticide treatment is applied. The fruit flies, Tephritidae, are not important because market fruit is all picked pre-ripe; this is because of either a rush need for cash from the crop, fear of damage by fruit-eating bats, or fear of the neighbors picking the crop.

Very little attention is given now to insects which themselves produce a marketable product. Sericulture was tried in the past but apparently was unsuccessful. Beekeeping is not practiced but there is some collection from wild hives; both honey and bee larvae are marketable. Termites, large gryllids and other insects are standard dietary items of the poorer people in many areas.

Insecticides

Derris and pyrethrum are the only locally-grown insecticides. Derris used to be produced in great quantity to supply an export market but is now grown only in very small amounts. During the war most of the processing factories were destroyed. Since locally-grown derris is more expensive than imported DDT, there is at present almost no demand for that crop. The production of pyrethrum has also dropped considerably. The annual production is about 50 tons and over 90 tons are imported for the manufacture of a mosquito repellent.

Nicotine is not processed from tobacco culture or factory wastes through lack of processing equipment and transport. Probably no tobacco wastes are used on the farms for preparing home-made nicotine sprays.

Recent experience with synthetic insecticides has not encouraged their use. The climate of Indonesia is such that very little protective clothing can be worn in the field. Failing to appreciate the potential danger of synthetic insecticides, the workers become careless and they tend to ignore all precautionary instructions. The very small field plots and the lack of access roads or even trails mean that only application equipment carried by man can be used. As proved on Java this year these circumstances make it extremely dangerous to use any insecticides which are toxic to man, either through contact or inhalation.

The excessive residues on cabbage resulting from frequent application of high dosages of DDT indicate the danger to consumers of insecticides even though they are not dangerous to man on contact.

Resistance of *Plutella* was noted in the field after two years of application of DDT (1); resistance of *Helopeltis* showed up after three to four years. Resistance of mosquitoes to DDT has also been noted on Java. With normally continuous generations in Indonesia the resistance problem will develop more quickly than in temperate zones.

An understanding of the financial inability of smallholders to prevent large losses by the use of insecticides on any but high-price crops can be gained from considering the ratio of prices to labor that prevail in this area. In the farm areas an employed man usually receives less than five rupiahs a day. Most of the farmers do not receive a cash income but have their own one-hectare or smaller plot to support them and their large families. About half of the smallholders' land is too

dry during six months of the year to produce any crop. Many of the farmers obtain working capital by borrowing from local money lenders at very high rates. Compared with their income and available working capital, any expenditure for insecticides and equipment is very high.

The following examples indicate the costs of insecticides and equipment in the larger cities; prices in the villages are often 50 percent or more higher.

Wettable DDT, 50 percent (imported) 10 Rp. per kg.
DDT dust, 5 percent (local blend) 4 Rp. per kg.
Nicotine sulphate, 40 percent (imported) 20 Rp. per liter
Derris, 8 percent (local product) 100 Rp. per kg.
Knapsack sprayer, 18 liters capacity (imported) 750 Rp.
Knapsack sprayer, 12 liters (local) 450 Rp.
Knapsack sprayer, 8 liters (local) 200 Rp.

The deaths of field workers, the danger to consumers of insecticide residues, the rapid development of resistant insect populations, the high costs of equipment and chemicals, the lack of working capital by smallholders and the dislocation of the biological balance of normally unimportant insects suggest that chemical control can only be a very temporary expedient in Indonesia.

Entomology Workers and Their Training

The Indonesian Extension Service, which is responsible for the direction of insect control programs and the instruction of the farmers, employs abous 7,000 officials scattered throughout the country. About 80 percent have had six years of elementary schooling and can read and write Indonesian. Less than 20 percent have attended high school and know Dutch, and relatively few of these also understand English. Associated with the Extension Service is the General Research Institute in Bogor, Java, for studying smallholder problems and advising the Extension Service. At the present time in both of these organizations there are no field entomologists who have a college degree in entomology. There are about ten men who have taken a six-months' Colombo Plan training course in economic entomology or who have worked with the Dutch scientists and have an adequate basic knowledge of entomology.

One of the greatest problems is the assignment of workers to sections other than entomology. The higher officials in extension stations believe this must be done because the agricultural methods and cropping system of the country need extensive revision and there is a shortage of personnel for this work. It is hoped that the U.S. technical aid training program will indicate to these officials the importance and feasibility of controlling insects.

The U.S. Foreign Operations Administration technical aid program has at this time five agriculturists in Bogor working at the General Research Institute, three being in the Plant Pest and Disease Section. The economic entomology program includes training of extension workers, importation of a few biological control agents for possible immediate relief and the development of home–made application equipment and home–grown insecticides for use in insect control. In order that the Extension Service men on duty at field stations can be trained to report and control insect outbreaks, two elementary guides in Indonesian have been prepared. One entitled "How to Know Agricultural Insects" gives a short introduction to the life history of insects. Another entitled "How to Control Agricultural Insects" explains the background of insect outbreaks and the general methods used for control.

At Bogor, the University of Indonesia has recently opened a College of Agriculture. Dr. van der Vecht, in charge of the Entomology Department and aided by Ir. Bergmann, gives a few courses as part of the five–year curriculum. Three entomology students, who are on government scholarships which require that they work for the state after graduation, are expected to join the staff of the Plant Pest Section, General Research Institute. The Institute has its own three–year training program for a small number of men; Dr. Vos is teaching the entomology course. Three or four students are expected to be assigned to pest control.

The Zoological Museum of the Botanical Garden, Bogor, is continuing the collection and classification of Indonesian insects. Mr.

A.M.R. Wagner is in charge, aided by Mr. De Gunst and Mr. Dresscher. Collecting expeditions are still being sent out, especially to East Indonesia. The aid of outside specialists for identifying insects in certain families is requested.

Conclusions

In general, adequate control methods are known and practiced for economic insects affecting high–priced, non–perishable crops which are exported or consumed far beyond walking distance of the area where produced. Rice is an exception; in spite of losses of at least 25 percent caused by insects, no adequate control measures are generally practiced. Perishable crops which are consumed locally are in adequate production to meet demand, although no insect control is practiced in many cases losses to perishable crops due to insects are regularly over 50 percent.

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Plant Pests in British Colonial Dependencies in 1954 [1]

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Asia

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THE army worm, *Cirphis unipuncta* Haw. (Lep. Noctuidae), appeared in Kowloon in 1952 for the first time for over 23 years. It reappeared, on a much larger scale, in the second paddy crop of 1953. The area affected was about 500 acres and the outbreak was brought under control in ten days by a combination of treating the irrigation water with a film of kerosene and of spraying the crop, preferably by night, with one part of a 24 percent DDT emulsion in 200 parts of water.

Observations on the rice stem-borer, *Schoenobius incertulas* (Wlk.) (Lep. Pyralidae), in 1953-54 showed that emergence takes place at temperatures between 70° and 90° F. There were four flight periods in the year, between 19 March and 18 April, 25 May and 11 June, 28 June and 31 July, 16 September and 31 October respectively. The highest peak of emergence of moths was in the fourth period in 1953, but in the third in 1954, corresponding to the condition of full bloom in the late and early rice crops, respectively. Percentage damage in the early and late crops was 2 and 5-10 percent in 1953 and 30 and less than 5 percent in 1954. During the late-crop period of 1954 some 340 acres of rice nurseries and paddy fields were sprayed against this pest. Sprays containing endrin, parathion, dieldrin, gamma BHC or DDT proved very effective.

[1] Owing to the very few reports that were received in the first half of 1954, the present report covers the whole year.

Africa

Nigeria

Attack by the pink bollworm, *Platyedra gossypiella* Saund. (Lep. Gelechiidae) and the spiny bollworm, *Earias* sp. (Lep. Noctuidae), in Northern Nigeria was not exceptional.

Cotton in the Northern Region was dusted with 10 percent DDT and 3 percent gamma BHC, mainly against Mirids. At Moor Plantation Research Station, cotton received a routine application of Agrocide cotton dust, mainly against Mirids, stainer-bugs and bollworms.

Sorghum, millet and maize suffered important damage in several areas.

Maize in Ogoja Province was severely attacked by stem-borers of the genus *Sesamia* (Lep. Noctuidae), millet in Bida Province was severely stunted by larvae of *Chilo* sp. (Lep. Pyralidae), probably *C. ignefusalis* (Hmps.), and *Pennisetum* in Sokoto Province was also seriously attacked by *Chilo* sp. Adults of *Pachnoda interrupta* (F.) (Col. Cetoniidae) caused considerable damage to flowering heads and ears of millet and sorghum in Bornu Province.

The Galerucid beetle, *Monolepta goldingi* Bryant, caused very severe damage to millet in Adamawa Province and attacks by the large cricket, *Brachytrypes membranaceus* (Dru.), necessitated repeated resowing of sorghum in Kano Province. *Brachytrypes* attacked a variety of crops, groundnuts being the most severely affected.

Yams in Delta Province suffered 70 percent damage from the yam beetle, *Hetoroligus meles* (Billb.) (Col. Scarabaeidae), and a severe attack by the yam scale, *Aspidiella*

hartii (Ckll.) (Hom. Coccoidea), was recorded in Ogoja Province.

Cacao suffered considerable damage from *Distantiella theobroma* (Dist.) (Hemipt. Miridae) and *Anoplocnemis curvipes* (F.) (Hemipt. Coreidae).

The coffee-berry borer, *Stephanoderes hampei* (Ferr.) (Col. Scolytidae), caused 60 percent loss of crop from robusta coffee at Moor Plantation.

Coconut palms in the Eastern Region were attacked by a rhinoceros beetle (*Oryctes* sp.) and oil palms in Plateau Province by weevil larvae (*Rhynchophorus* sp.).

Young citrus in nurseries in Ijebu Province was severely damaged by several species of grasshopper, notably *Zonocerus variegatus* (L.) and of lepidopterous larvae, notably *Papilio demodocus* Esp. *Aphis citricidus* (Kirk.) did some damage in Ijebu and Oyo Provinces.

Island of St. Helena

Attack by an eelworm caused the collapse, in 1950, of bulb production of *Lilium longiflorum* as a small export crop. Routine treatment of bulbs with hot water, combined with rotational planting, appears to have effected control and action has been taken to try to restore the export industry.

British West Indies

Jamaica

The infestation by the West Indian cane fly, *Saccharosydne saccharivora* (West.) (Homopt. Delphacidae) mentioned in the previous report (see *FAO Plant Prot. Bull.* 2: 82. 1954.) persisted until May 1954. Early in the year many hundreds of acres of young cane became infested by adults of the pest that migrated from old cane that had been reaped. Application of insecticides became necessary, both DDT and BHC giving effective kills. The projected biological control has been initiated with the introduction and liberation of a series of consignments of *Cyrtorhinus mundulus* (Bredd.) (Hemipt. Miridae) from Hawaii, and of four consignments of *Pseudogonatopus* sp. (Hym. Dryinidae) from southern Trinidad. By the latter half of 1954 the situation appeared to have returned to normal.

Plant Disease Situation in the United States [1]

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Rasp Leaf Virus Disease of Sweet Cherry in New Mexico

RASP leaf, a virus disease of sweet cherry (*Prunus avium*), has been identified in southern New Mexico, on the Lambert variety in a 20-year-old orchard. Eight localized trees in the 200-tree orchard were infected. A survey of other cherry orchards in the vicinity did not reveal the presence of additional infected trees.

As often happens with this disease, the eight diseased trees differed in the amount of evident infection. Two trees were affected throughout; the other six showed symptoms on from two to three branches to as much as two-thirds of the crown. The grower reported that he had first seen the disease only about four or five years ago. The time and source of the infection are unknown. The trees were budded locally 19 or 20 years ago. The incubation period of rasp leaf is said to range from nine months to two years.

Rasp leaf was first reported in 1935 from Colorado on sweet cherry, but its cause was not determined until 1942. Since then it has been reported from Washington, Montana, Idaho, Utah and California, and from British Columbia, on Lambert, Napoleon (Royal Ann), Bing, and Black Tartarian sweet cherry, on mazzard (*P. avium*) seedlings, and on Montmorency sour cherry (*P. cerasus*).

The disease is characterized by the various descriptive common names, including, besides rasp leaf, leaf enation, ruffled leaf and cockscomb, which refer to distortion and to the abnormal outgrowths between the veins on the under surface of the leaves. Severely affected leaves are small, narrow and distorted and often fold inward, giving the trees a defoliated appearance. Reduction in terminal growth is also common and results in resetting of leaves on the lateral branches of infected trees. The fruit is normal in size and texture but production is much reduced in comparison with healthy trees.

It has been suggested that rasp leaf and the European *Eckelrader* disease or *Pfeffingerkrankheit* are related but, as previously noted (see *FAO Plant Prot. Bull.* 2: 136–137. 1954), results of virus indexing of imported cherries at Oregon State College do not support this theory.

Virus Diseases of Small Grains in Wyoming

Three virus diseases of small grains have been identified in Wyoming. These are wheat streak mosaic, barley false stripe and barley yellow dwarf. Wheat streak mosaic is most important.

Wheat streak mosaic was first recognized in the State in July 1951, although it seems likely that wheat in certain areas had been affected for years before.

During surveys in 1952, infection from a trace to 100 percent was observed in winter wheat in Laramie, Goshen, Platte, Niobrara, Sheriden and Campbell Counties. Yield losses ranged from 10 to 100 percent in many fields in Laramie, Goshen and Platte Counties. The most severe infection and greatest losses occurred in locations with abundant volunteer wheat where, during the previous year, hail had threshed mature grain onto the ground. There was some loss in spring wheat planted near infected winter wheat.

In June 1953, in addition to the six counties with known infestations in 1952, wheat streak mosaic was found in Johnson, Crook, Weston and Carbon Counties. Infection ranged from a trace to 100 percent, with greatest losses in southeastern Wyoming where all of the 145 fields inspected contained mosaic. Several fields were not harvested because of the disease.

Surveys in southeastern Wyoming in the autumn of 1953 showed wheat streak mosaic

[1] This report is based upon material submitted by Collaborators of the Plant Disease Epidemics and Identification Section, Agricultural Research Service, United States Department of Agriculture.

to be generally present in young winter wheat in Laramie, Goshen and Platte Counties. Approximately 90 percent of the 60 fields inspected contained the disease. Volunteer and early-planted wheat were most severely affected. Infection was relatively low in late-planted fields. Much volunteer wheat, growing where mature wheat had been damaged by hail and in uncultivated fallow strips, was heavily infected. The virus spreads from infected volunteer wheat to wheat fields.

The warm late autumn of 1953 and the open winter were conducive to a build-up in the population of the eriophyid mite, *Aceria tulipae*, the important vector of the wheat streak mosaic virus. Severe infection of winter wheat was observed in June 1954. The disease was generally present over the eastern part of the State where winter wheat is grown, and crop loss was great est in this area. In Goshen County many fields were ploughed under in early June and planted to sorghums. A considerable acreage was not harvested in Platte County because of the disease. In northeastern Wyoming infection ranged from a trace to 25 percent. A few fields in Crook County showed 100 percent infection, with total loss in some of them. Spring wheat infection was rather high in fields planted late and near infected winter wheat. A trace of infection was found in a few fields of barley and oats.

Four annual grasses — green foxtail, (*Setaria viridis*), downy bromegrass (*Bromus tectorum*), Japanese bromegrass (*B. japonicus*) and barnyard grass (*Echinochloa crusgalli*) — were found to be infected under natural conditions. Several perennial grasses present in the State are susceptible but have not been found to be naturally infected.

Wheat streak mosaic was found only rarely in spring grains in the irrigated farming areas.

False stripe (stripe mosaic) was observed in Frontier barley in the nursery at Laramie in 1953. In 1954 rather high infection was noted in the Frontier, Compana, Spartan and Glacier varieties of barley and in Pilot wheat in nurseries at Laramie, Torrington, Sheridan and Gillete. Surveys revealed the presence of false stripe in nearly all barley fields in northeastern Wyoming. In most fields infection ranged from a trace to 5 percent but in one field infection was about 25 percent. In north central Wyoming only a trace of the disease was observed in a few scattered fields of barley. False stripe was not detected in fields of any small grains in other parts of the State.

Yellow dwarf was found in 1954 throughout the State where small grains are grown. It has evidently been present for some time.

Losses are difficult to estimate, particularly in winter wheat in which yellow dwarf is sometimes confused with wheat streak mosaic. At least a trace of yellow dwarf was present in nearly all fields of barley and oats inspected throughout the State. Heaviest infection appeared to be in the irrigated areas of Goshen County. In barley, heaviest infection was about 10 percent. The disease is more readily seen in oats owing to the red coloration of the leaves of infected oat plants, and incidence in oats appeared much higher than in barley.

Aphid transmission of the yellow dwarf virus from plants of barley and oats collected in the field was successful in the greenhouse.

Yellow dwarf virus was also transmitted to Victory oats by two species of aphids, *Macrosiphum granarium* and *Toxoptera graminum*, from diseased plants of Cheyenne wheat collected in fields heavily infected with the wheat streak mosaic virus.

False Broomrape of Tobacco in Florida

The description of "false broomrape" reported from Kentucky (see *FAO Plant Prot. Bull.* 2: 134–136. 1954), fits a disorder that was found on tobacco in Alachua County, Florida, in 1951 and again in 1952. Its appearance suggested broomrape, but detailed examination produced no evidence of the presence of *Orobanche*. The disorder was characterized by clumps of whitish, curled leaf-like outgrowth from the roots, below the soil surface. In a few instances some of the clumps emerged above ground and became a normal green in color with the general texture of healthy tobacco foliage. The abnormal outgrowths appeared on pencil-size seedlings soon after setting and on two-thirds-grown plants. None of the many possible explanations suggested seem satisfactory, but no research has been undertaken.

Plant Quarantine Announcements

Cyprus

Phylloxera and Other Plant Disease Prevention Order of 1 November 1954, published as Order in Council No. 2716 in Supplement No. 3 to the *Cyprus Gazzette* No. 3789, 4 November 1954, amends the Order in Council No. 1305 of 20 May 1929 governing the importation of seed potatoes. These two orders may be cited together as the Phylloxera and Other Plant Diseases Prevention Orders, 1929 and 1954.

Under the 1929 Order, each consignment of seed patotoes offered for importation should be accompanied by, in addition to official certificates, a statutory declaration by the shipper in prescribed form, including a statement that such potatoes were not grown in land infested with potato tuber moth (*Phthorimaea operculella*), wart disease (*Synchytrium endobioticum*) and Colorado beetle (*Leptinotarsa decemlineata*). The 1954 Order adds potato root eelworm (*Heterodera rostochiensis*) to the diseases, freedom from which in the land of origin should be specifically indicated in the shipper's statement.

United Kingdom (England and Wales)

The Importation of Plants Order, 1955, supersedes the Importation of Plants Orders, 1947 to 1954, the Importation of Plants (General Licence) Orders, 1953 to 1954, and the Importation of Raw Cherries Order, 1954. This new Order will come into operation on 1 April 1955, except as regards the provisions relating to imports of seeds which will not become operative until 1 July 1956. The more important provisions of this new Order are as follows:

Prohibited imports.

(*a*) Potatoes, including any part of the potato plant, for planting.
(*b*) Potatoes, including any part of the potato plant, for any purpose, from the American Continent or Australia.
(*c*) Annual and biennial plants, from places outside Europe.
(*d*) *Fragaria* spp. and *Rubus* spp., from North America.
(*e*) *Prunus* spp. (including *amygdalus, armeniaca, cerasus, laurocerasus, padus* and *persica*) from places outside Europe.
(*f*) *Rosa* spp. from Australia, Italy or New Zealand.

Restricted imports. Subject to the prohibitions and the requirement of certificates specified in the Order, the landing of the following plant produce will be subject to conditions indicated.

(*a*) Living plant and parts thereof (excluding fruit, raw vegetables, seeds, potatoes and cut flowers). Importation is prohibited unless (*i*) they have been inspected during the preceding growing season by an authorized officer of the country of origin and found to be substantially free from injurious pests and diseases, including virus diseases; (*ii*) wart disease (*Synchytrium endobioticum*) has not occurred during the preceding 10 years within a radius of 2 km. from the growing field; and (iii) either Colorado beetle (*Leptinotarsa decemlineata*) is not known to be established within a radius of 25 km. from the growing field or there is an intensive control system in operation.

In the case of any plant listed below, San José scale (*Quadraspidiotus perniciosus*) must not have occurred within a radius of 20 km. from the growing field during the two preceding years and, if the pest has occurred during the said two years in any part of the country of origin, they must have been fumigated, before despatch, with hydrocyanic acid gas (minimum concentration 5 gm. per cubic meter for 30 minutes at 7° C.).

Acacia spp.
Amelanchier spp.
Chaenomeles spp. (including *Cydonia japonica*)
Cotoneaster spp.
Crataegus spp.
Cydonia vulgaris
Fagus spp.
Juglans spp.
Maclura aurantiaca
Malus communis
Populus spp.
Prunus spp. (including *amygdalus, armeniaca, cerasus, laurocerasus, padus* and *persica*)
Ptelea trifoliata
Pyrus spp.
Ribes spp.
Rosa spp.
Salix spp.
Sorbus spp.
Symphoricarpus spp.
Syringa spp.
Tilia spp.
Ulmus spp.

(*b*) Potatoes. Wart disease or ring rot (*Corynebacterium sepedonicum*) must not have occurred at any time within a radius of 2 km. from the growing field and there must have been no outbreak of Colorado beetle within a radius of 25 km. from the growing field during the preceding 12 months.

(*c*) Lettuce seed. The crops producing the seed must have been examined during the growing season by an authorized officer of the country of origin and found to be free from lettuce mosaic.

(*d*) Tomato seed. The crops producing the seed must have been examined during the growing season and found to be free from bacterial canker (*Corynebacterium michiganense*) or have been grown in a region free from this disease.

(*e*) Pea seed for sowing. The crops producing the seed must have been examined during the growing season and found to be free from bacterial blight (*Pseudomonas pisi*) or have been grown in a region free from this disease.

(*f*) Raw cherries from continental Europe. The landing of raw cherries grown in the countries or districts specified below is prohibited during the indicated periods in any year.

Prohibited 1 June to 30 September:

Italy excluding the northern regions
Portugal
Spain.

Prohibited 16 June to 30 September:

Northern Italy comprising the regions of Val d'Aosta, Piedmonte, Liguria, Lombardia, Alto Adige–Trentino, Veneto, Friuli–Venezia Giulia and Emilia–Romagna.
Southern France comprising the part south of latitude 46° N.
Austria
Bulgaria
Hungary
Yugoslavia

During the periods when the importation of raw cherries is not prohibited, each consignment must have been examined by an authorized officer of the country of origin and found to be free from larvae of the cherry fruit fly (*Rhagoletis cerasi*).

(*g*) Apples from U.S.A. The landing of apples grown in the United States is prohibited from 7 July to 15 November in any year unless they are of the following recognized grades, namely; U.S. Fancy, U.S. No. 1, Extra Fancy and Fancy.

(*h*) Lettuce from continental Europe. The landing, from 1 March to 15 October in any year, of lettuce grown in Europe south of latitude 46° N. and the landing, from 1 April to 15 October in any year, of lettuce grown in Europe north of latitude 46° N., is prohibited unless there has been no outbreak of Colorado beetle during the preceding twelve months within a distance of 25 km. of the growing place.

(*i*) Raw vegetables (other than lettuce) from continental Europe. The landing of such vegetables grown in Europe is prohibited from 1 April to 15 October in any year unless there has been no outbreak of Colorado beetle during the preceding twelve months within a distance of 25 km. of the growing place. Root vegetables free from foliage, asparagus, aubergines, capsicums, cucumbers, green beans, green peas, marrows, mushrooms, onions and shallots, pimentos, pumpkins, tomatoes and witloof chicory are exempted from this restriction and also from the requirement of a certificate.

Certificates required. Each consignment of plant material offered for importation should be accompanied by a certificate, duly completed and signed by or on behalf of an authorized officer of the phytopathological service of the country of origin. The certificate must be given in English, and where the language of the country issuing the certificate is other than English, a translation into the language of that country must be included.

For living plants, planting materials and potatoes, the certificate should conform with the model certificate provided in the International Plant Protection Convention of 1951. The examination referred to in the certificate should have been carried out within 14 days prior to the date of despatch.

For plant products, including seeds, fruit and vegetables a simpler form of certificate, attesting that the plant products involved are believed to conform with the current phytosanitary regulations of the importing country, is required.

General regulations. If any plant produce is imported in contravention of the Order it will be destroyed or re-exported, unless it is disposed of in accordance with the terms of a licence issued by an authorized officer of the Ministry of Agriculture and Fisheries. Imported produce may be examined and sampled by an authorized officer. The importer or person in charge of any such produce or plants found to be unhealthy may be required to disinfect, destroy or re-export them. Imported plants may also be examined any time up to twelve months from the date of importation. Persons possessing or dealing in imported produce may be required to disclose to an authorized officer particulars of the persons who have or have had charge of such produce.

Importation of forest trees. Nothing in this new Order will be deemed to permit the importation of any forest trees or parts thereof, the landing of which is prohibited or restricted under the Importation of Forest Trees (Prohibition) Order, 1952, or any other Order made by the Forestry Commissioners.

Scotland and Northern Ireland have made similar Orders governing the importation of plants into Scotland and Northern Ireland.

United States

Administrative instructions prescribing method of treatment of garlic from Algeria, Hungary, Italy, Morocco, Spain and Yugoslavia (see *FAO Plant Prot. Bull.* 2: 143. 1954) was amended by Foreign Quarantine Notice (P.Q. 607, amended), published in the *Federal Register*, Vol. 19, No. 191, 1 October 1954.

As an alternative to the requirement of fumigation with methyl bromide, shipments of garlic (*Allium sativum*) from Italy and Spain may be allowed to enter, through the authorized ports, into the United States under permit, if a certificate issued by the appropriate official of the country of origin is provided. The certificate should certify that the garlic is free from living stages of *Brachycerus* spp. and *Dyspessa ulula*, based upon field inspection and certification and subsequent re-examination at the port of despatch, and should show that the shipment is either initially free from these pests or has been fumigated. The original copy of the certificate should accompany the shipment or, with the consent of the inspector, be mailed direct to the inspector in charge at the port of entry. In the latter case, a copy of the certificate should accompany the shipment. The shipment will be subject to inspection upon arrival and, if found infested with these pests, will be fumigated.

News and Notes

FAO Desert Locust Control Meeting

FAO convened a meeting in Madrid, 18 to 20 January 1955, between representatives of the French and Spanish Governments to discuss co-operation between the French and Spanish territories in northwestern Africa in matters related to desert locust control. As a basis for a formal agreement between the two governments, the Meeting recommended procedures for the improvement and acceleration of the exchange of locust information and annual discussions between the technicians of the territories concerned.

European Plant Protection Organisation

One of the recommendations of the conference on the Mediterranean fruit fly (*Ceratitis capitata*) held in Algiers in January 1954 was that the European Plant Protection Organisation (EPPO) should endeavour to secure coordination of a program of investigation into modern methods of controlling this serious citrus pest. A suggested program of work was attached to the report. The proposal was subsequently discussed with the OEEC, and later, after consultation with the French and Algerian authorities, M.P. Frézal, Head of the Algerian Plant Protection Service, was nominated to visit the various citrus research stations in the Mediterranean area and endeavour to secure the initiation of a coordinated scheme of control measures. This visit is now in progress, the countries concerned being France, Greece, Israel, Italy, Libya, Morocco, Portugal, Spain, Tunisia, Turkey. The cost of the tour is being met partly by the European Productivity Agency Funds administered by the OEEC, and partly by EPPO.

The report of the Working Party on Seed-borne Diseases, convened by EPPO in collaboration with the International Seed Testing Association (ISTA) in July 1954, has been published. The main recommendation of the Working Party is that ISTA should be encouraged to embark on a policy of building up, disease by disease, internationally acceptable instructions on testing methods. To help towards this end, the Working Party gives an agreed first list of 14 injurious seed-transmitted organisms which so far have not been recorded in Europe or have been found only in certain territories. The list is accompanied by explanatory notes regarding each organism. It does not include organisms affecting the more southerly crops, such as rice and cotton these will be considered by a small group of specialists to be convened in the near future.

Among technical meetings to be arranged in 1955 may be mentioned two Working Parties, dealing respectively with the San José scale (*Aspidiotus perniciosus*) and the simplification and unification of phytosanitary regulations, and an international conference on the potato root eelworm (*Heterodera rostochiensis*). The San José scale Working Party, which will meet in Lyons, France, from 29 March to 1 April 1955, will discuss the economic importance of the insect, various biological problems relating to its development and spread, its effect on international trade, methods of control and the scientific grounds on which phytosanitary restrictions should be based. So far as the Working Party on phytosanitary regulations is concerned, it is hoped that this will mark a further step forward in encouraging the growing wish of European governments for a substantial simplification of phytosanitary procedure. The Working Party will meet in Paris from 22 to 23 February 1955 and will include representatives of FAO, the OEEC and probably of the Council of Europe.

The conference on the potato root eelworm will be held at Wageningen, Holland, on 6 July 1955, immediately following a scientific symposium on nematodes organised by the Netherlands Government. It is probable that some members of the symposium will attend the EPPO conference, which will be concerned more with the practical aspects of potato root eelworm control and with methods which might be recommended to prevent the spread of this pest.

The next meeting of the Council of EPPO will be held in Paris from 27 to 28 April 1955. One important matter for consideration will be the amendment of the Convention establishing the EPPO. A number of alterations to the text will be proposed by the Executive Committee; these do not involve questions of principle but are mainly drafting changes, together in some cases with a revised form of presentation necessary to meet existing conditions.

Distribution of Certain Insects in Western Europe and the Mediterranean

At the request of the Government of France, an enquiry was made by the European Plant Protection Organisation in May 1954 on the distribu-

tion of seven insect pests which have caused growing concern in France. The information thus obtained is as follows:

1. *Laspeyresia molesta* (oriental fruit moth) Yugoslavia, Italy, Switzerland, France, French Morocco
2. *Ceresa bubalus* (buffalo treehopper) Yugoslavia, Italy, Switzerland, France, Spain
3. *Taeniothrips simplex* (gladiolus thrips) France, Spain, Portugal, French Morocco, Israel, Austria, Germany, Saar, Belgium, Netherlands, Jersey, United Kingdom
4. *Sesamia cretica* (stem borer) Greece, Yugoslavia, Trieste, Italy, France, Spain, French Morocco, Algeria, Israel
5. *Chilo suppressalis* (Asiatic rice borer) Spain, Portugal, Israel (?)
6. *Dialeurodes citri* (citrus whitefly) France, French Morocco (?), Algeria (?)
7. *Tridomyrmex humilis* (Argentine ant) Italy, France, Spain, Portugal, United Kingdom.

These insects obviously have limited geographic distribution, except *Taeniothrips simplex*, which has spread rapidly to many countries in Western Europe since 1947.

In the case of *Sesamia cretica*, a borer which attacks maize and sorghum in many southern countries, the picture is more complicated. First, the species is probably often in direct competition with *Pyrausta nubilalis* (European corn borer), which might reduce the possibilities of its spread locally. Perhaps this explains such differences as exist between northern Italy where *Pyrausta* is prevalent, and Trieste where *Sesamia* is far more abundant. Towards the southwest and south other *Sesamia* species gradually take the place of *S. cretica*. In Spain and Morocco *S. vuteria* (= *S. nonagrioides*) is reported to be more important than *S. cretica*, and in Portugal *S. vuteria* exists but *S. cretica* is not found. On the other hand, this pest has caused severe damage in southern France.

Laspeyresia molesta is often found together with the other peach twig borer, *Anarsia lineatella*, the latter being even more important in some countries. In both species, the larvae of the first generation or generations cause top wilting by mining a number of young shoots, whereas larvae of the later generations attack the fruits.

Roma - Tip. del Senato del dott. Giovanni Bardi

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